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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/521,412	04/29/2005	Andrew Edward Feiring	SR0015USPCT	9054

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E.I. du Pont de Nemours and Company
Legal - Patents
Wilmington, DE 19898

EXAMINER

WU, IVES J

ART UNIT

PAPER NUMBER

1713

DATE MAILED: 03/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/521,412	Applicant(s) FEIRING ET AL.	
	Examiner Ives Wu	Art Unit 1713	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 August 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>8/11/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

The numbering of claims is not in accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When claims are canceled, the remaining claims must not be renumbered. When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered claims previously presented (whether entered or not).

Misnumbered claim (2nd) 16 would have been renumbered 17.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

(1). **Claims 1-2, 4-8, 10-14 and 18-28** are rejected under 35 U.S.C. 103(a) as being unpatentable over Feiring et al (WO00/67072) in view of Malik et al (US20030022097A1).

Art Unit: 1713

(2). As to the component A in the fluorine-containing copolymer in **independent claim 1**, Feiring et al (WO 00/67072) disclose the fluorinated polymers, photoresists that involve a fluoroalcohol functional group may have structure: $-XCH_2C(R_f)(R_f')-OH$, wherein R_f and R_f' are the same or different fluoroalkyl groups of from 1 to about 10 carbon atoms or taken together are $(CF_2)_n$, where n is 2 to 10; X is selected from the group consisting of oxygen, sulfur, nitrogen, phosphorous (page 13, line 3-10).

As to the component B in the fluorine-containing copolymer in **independent claim 1**, Feiring et al (WO 00/67072) **do not teach** the 2nd repeat unit derived from an acrylate selected from the group consisting of $CH_2 = CRCO_2R''$ and $CH_2 = C(CH_2OH)CO_2R''$ wherein R is H, F or a C_{1-5} alkyl or fluoroalkyl group; R'' is a polycyclic C_{5-50} alkyl group containing at least one hydroxyl group.

However, Malik et al **teach** a photosensitive resist composition comprising a polymer of tertiary-butyl acrylate, a photoacid generator, a solvent and optionally a basic compound (Abstract). Examples of the monomeric unit include, but are not limited to tertiary-butyl hydroxymethyl acrylate ([0009]-[0010]).

The advantage of using t-butyl hydroxymethyl acrylate in the resist composition is to produce high resolution photoresist patterns ([0001]).

Therefore, it would have been obvious at time the invention to include the t-butyl hydroxymethyl acrylate of Malik et al in the fluorinated polymers of Feiring et al in order to obtain the above-mentioned advantage.

As to the limitation of **dependent claim 2**, Malik et al disclose examples of the monomeric unit including, but are not limited to tertiary-butyl hydroxymethyl acrylate ([0009]-[0010]).

As to the repeat unit of 2-methyl-2-adamantyl acrylate in **dependent claim 4**, Feiring et al disclose examples of components having protected acidic groups that yield an acidic group as hydrophilic group upon exposure to photogenerated acid include, but not limited to, A) esters such as 2-methyl-2-adamantyl ester (page 15, line 1-3, 14-15). It is well known that acrylate is ester.

Art Unit: 1713

As to limitation of **dependent claim 5**, it is noticed that instant claim is product-by-process claim, although prepared in a different manner, appeared to be the same as the claimed product. *In re Thorpe*, 227 USPQ 964 (CAFC 1985).

As to the limitation of **dependent claims 6,7 and 18**, Feiring et al disclose some representative examples of ethylenically unsaturated compounds and their corresponding repeat units are tetrafluoroethylene (page 12, line 17-20).

As to limitation of **dependent claim 8**, Feiring et al disclose a repeat unit derived from an ethylenically unsaturated compound comprised of a fluoroalcohol functional group having structure: $-C(R_f)(R_f')-OH$ (page 6, line 23-30).

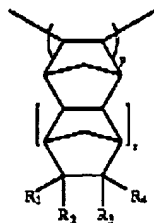
As to limitation of **dependent claim 10**, Feiring et al disclose the fluorinated polymers, photoresists involving a fluoroalcohol functional group having the structure:
 $-XCH_2C(R_f)(R_f')-OH$.

As to limitation of **dependent claims 11 and 12**, Feiring et al disclose the resulting protected fluoroalcohol group having the structure:
 $-C(R_f)(R_f')O-CH_2OCH_2R_5$ (page 15, line 29 - page 16, line 5).

As to limitation of **dependent claim 13**, Feiring et al disclose the structure:
 $-C(R_f)(R_f')-OH$ wherein R_f and R_f' are the same or different fluoroalkyl groups of from 1 to about 10 carbon atoms (page 7, line 9-18).

As to the limitation of **dependent claim 14**, Feiring et al disclose, in still another embodiment, the fluorinated polymer comprising the structure:

In still another embodiment, the invention is a fluorine-containing polymer comprising the structure:



wherein each of R_1 , R_2 , R_3 , and R_4 independently is hydrogen, a halogen atom, a hydrocarbon group containing from 1 to 10 carbon atoms, a substituted hydrocarbon group, an alkoxy group, a carboxylic acid, a carboxylic ester or a functional group containing the structure:



(page 9, line 1-16).

Art Unit: 1713

(3). As to the component A in a photoresist in **independent claim 19**, the disclosure of Feiring et al (WO 00/67072) and Malik et al (US20030022097A1) is incorporated herein by reference, the most subject matters of component Ai and Aii as claimed has been recited in applicant's claim 1, and has been discussed in paragraph (2).

As to the photoresist in **independent claim 19**, Feiring et al disclose the embodiments comprising a photoresist (page 3, line 33).

As to the component B, at least one photoactive component in **independent claim 19**, Feiring et al disclose photoactive component (page 14, line 10).

As to the limitation of **dependent claim 20**, Feiring et al disclose dissolution inhibitors and additives (page 16, line 19).

As to the limitation of **dependent claim 21**, Feiring et al disclose a solvent (page 10, line 32).

(4). As to the coatable photoresist composition in 1st step of a process for preparing a photoresist composition in **independent claim 22**, the disclosure of Feiring et al (WO 00/67072) and Malik et al (US20030022097A1) is incorporated herein by reference, the most subject matters of a fluorine-containing copolymer, a photoactive component and a solvent as claimed, has been recited in applicant's claims 1, 19 and 21, and has been discussed in paragraph (2) and (3).

As to the 1st step of applying a coatable photoresist composition on a substrate in **independent claim 22**, Feiring et al disclose in another embodiment, the invention is a process for preparing a photoresist image on a substrate comprising: applying a photoresist composition on a substrate (page 10, line 9-11).

As to the coatable photoresist composition in 1st step in **independent claim 22**, the disclosure of Feiring et al and Malik et al meets the requirements of the present claim both in terms of the types of materials added and their contents. It is reasonable to presume that the composition of the references would also be coatable photoresist as presently claimed in light of its chemical similarities.

As to 2nd, 3rd and 4th steps of the process in **independent claim 22**, Feiring et al disclose step of drying the photoresist composition to substantially remove the solvent and thereby form a

Art Unit: 1713

photoresist layer on the substrate, step of imagewise exposing the photoresist layer to form imaged and non-imaged areas, and step of developing the exposed photoresist layer having imaged and non-imaged areas to form the relief image on the substrate (page 11, line 6).

As to the limitation of **dependent claim 23**, Feiring et al disclose the structure:

$-C(R_f)(R_f')-OH$ wherein R_f and R_f' are the same or different fluoroalkyl groups of from 1 to about 10 carbon atoms (page 7, line 9-18).

As to the limitation of **dependent claim 24**, Feiring et al disclose preferably, the functionality to be acid or protected acid such that aqueous development is possible using a basic developer such as sodium hydroxide solution, potassium hydroxide solution (page 18, line 20-21).

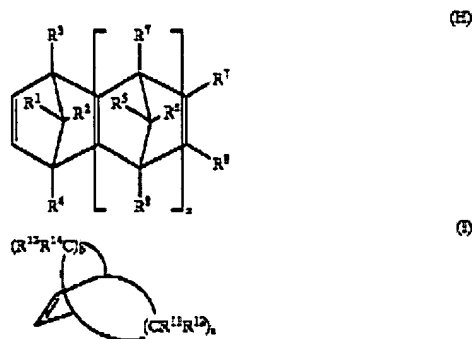
As to the limitation of **dependent claims 25-27**, Feiring et al disclose During development using either a critical fluid or an organic solvent (page 19, line 8). Carbon dioxide may be used for the critical fluid. Various organic solvents can also be used as developer in the patentee's invention. These include, but are not limited to, halogenated solvents and non-halogenated solvents. Halogenated solvents are preferred and fluorinated solvents are more preferred (page 19, line 14-18).

As to the limitation of **dependent claim 28**, Feiring et al disclose preparing a photoresist image on a substrate (page 8, line 7-8) where the substrate can illustratively be a silicon, silicon oxide or various materials used in semiconductive manufacture (page 19, line 20-22).

(5). **Claims 15-17** are rejected under 35 U.S.C. 103(a) as being unpatentable over Feiring et al (WO 00/67072) in view of Malik et al (US20030022097A1), and further in view of Feiring et al (WO 00/17712).

As to the repeating units from cyclic or polycyclic compounds represented by the structures (H) or (I) in **dependent claim 15**, cyclic or polycyclic unsaturated compounds in **dependent claims 16 and 17**, both Feiring et al and Malik et al **do not teach** compound with these structures as claimed.

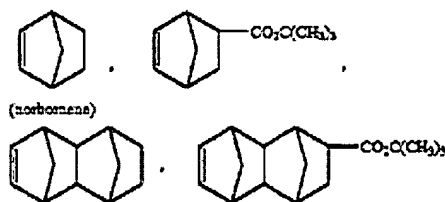
However, Feiring et al (WO 00/17712) **teach**, in one preferred embodiment, at least one ethylenically unsaturated compound to be selected from the group consisting of:



wherein n is 0, 1 or 2; a and b are independently 1 to 3 except that a is not = 1 when b = 2 or vice versa; R^1 to R^{14} are the same or different and each represents a hydrogen atom, a halogen atom, a carboxyl group, a C_{1-14} secondary or tertiary alkyl carboxylate, a hydrocarbon group or a substituted hydrocarbon group (page 4, line 1-8).

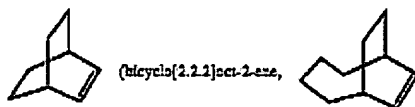
Representative comonomers having structure H include, but are limited to:

Representative comonomers having structure H include, but are not limited to:



(page 13, line 3-6).

Representative comonomers having structure I include, but are not limited to:



(page 13, line 8-12).

The advantages of using cyclic or polycyclic unsaturated compounds recited hereinabove is to have high transparency in the extreme/far UV as well as the near UV, high plasma etch resistance, and are useful for microlithography in the extreme, far, and near UV region, particularly at wavelengths ≤ 365 nm (Abstract, line 9-11).

Therefore, it would have been obvious at time the invention was made to include the monomers of cyclic or polycyclic unsaturated compounds of Feiring et al (WO 00/17712) in the

Art Unit: 1713

photoresist composition of Feiring et al (WO 00/67072), Malik et al (US20030022097A1) in order to obtain the above-mentioned advantages.

(6). **Claim 3** is rejected under 35 U.S.C. 103(a) as being unpatentable over Feiring et al (WO 00/67072) in view of Malik et al (US20030022097A1), and further in view of Nishimura et al (US006838225B2).

As to the limitation of **dependent claim 3**, both Feiring et al and Malik et al **do not teach** hydroxyadamantyl acrylate in the photoresist composition.

However, Nishimura et al **teach** a radiation-sensitive resin composition comprising (Abstract, line 1): one or more recurring units from mono-functional monomers which include 3-hydroxyadamantyl (meth)acrylate (Col. 14, line 37-39).

The advantage of using mono-functional monomers to form the resins is to provide a radiation-sensitive resin composition useful as a chemically amplified resist having high transmittance of radiation and exhibiting superior basic properties as a resist such as high sensitivity, resolution, dry etching tolerance, and pattern shaper (Col. 3, line 7-12).

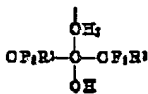
Therefore, it would have been obvious at time the invention was made to include the monomers of hydroxyadamantyl acrylate taught by Nishimura et al in the photoresist compositions of Feiring et al in order to obtain the above-mentioned advantage.

(7). **Claim 9** is rejected under 35 U.S.C. 103(a) as being unpatentable over Feiring et al (WO 00/67072) in view of Malik et al (US20030022097A1), and further in view of Adelman (US003444148).

As to the limitation of **dependent claim 9**, both Feiring et al and Malik et al **do not teach** the functional group $-(CH_2)C(R_f)(R_f')-OH$.

However, Adelman teaches solid film-forming copolymers of at least one of certain terminally unsaturated polyfluorinated alcohols such as $CH_2=C(R)-CH_2-C(CF_2R^1)(CF_2R^2)-OH$ in which R is hydrogen, lower alkyl and R^1 and R^2 are, separately fluorine, lower perfluoroalkyl (Abstract, Col. 1, line 39-48). It will be seen that, in the copolymers, the fluoroalcohol groups:

Art Unit: 1713



are always and exclusively present as side chain, or pending groups (Col. 5, line 69 – Col. 6, line 2).

The advantage of using this functional groups is actually to impart enhanced properties not found in homopolymer or copolymers of ethylenic compounds reacted therewith such as heat distortion (Col. 6, line 40-53).

Therefore, it would have been obvious at time the invention was made to include The fluoroalcohol functional group of Adelman as a repeat unit in a fluorine-containing copolymer of Feiring et al in order to obtain the above-mentioned advantage.


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ives Wu whose telephone number is 571-272-4245. The examiner can normally be reached on 8:00 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu can be reached on 571-272-1114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Examiner: Ives Wu
Art Unit: 1713
Date: March 13, 2006


DAVID W. WU
SENIOR PATENT EXAMINER
TECHNOLOGY CENTER 1700